and soil are discussed in another chapter, but more detail is required regarding the latter.

The chief part of the book (pp. 38-532) describes the forest species, and is done much in the same way as by Mathieu in "La Flore Forestière," with the addition of some sylvicultural details. It differs, however, from the latter by the addition of ninety-two excellent botanical plates, showing the structure of the branches, foliage, flowers, fruit and wood of the principal species.

The exotic species described are few in number, and most of them are without sylvicultural importance, except in Algiers and Corsica, where species of Eucalyptus, *Grevillea robusta* and *Casuarina tennissima* thrive. Of the few exotic broad-leaved trees which thrive in temperate districts, *Liriodendron tulipifera*, the wood of which from America, combining the qualities of lime, alder and poplar, is largely used in France, *Juglans nigra* and *Carya alba* deserve notice. Among conifers, the Douglas fir, Menzies spruce and *Thuya gigantea* may be mentioned, Weymouth pine having been long naturalised, and figuring among the indigenous species.

This is a valuable book, but its value would have been enhanced had there been more sylvicultural detail. The remaining three volumes will be awaited with interest. W. R. FISHER.

THE ART OF ILLUMINATION.

The Art of Illumination. By Louis Bell, Ph.D. Pp. ix + 345; with 127 illustrations. (New York: McGraw Publishing Co., 1902.) Price 2.50 dollars.

WHEN the importance of artificial light and its effect upon our comfort and eyes is considered, it seems impossible that the technique of healthy and satisfactory lighting should have been neglected in the way it has. The fact, however, remains that although there are books in plenty on the various available illuminants and the generation of light from them, yet the true art of illumination has received but scant attention.

Dr. Louis Bell, in attacking this important problem, has done well in devoting the first three chapters of his book to the effect of light and colour on the eye, and the works of Chevreul, Helmholtz and Abney are effectively laid under contribution to provide a firm foundation for the latter part of the work. The effect of faulty and flickering illumination upon the eye, and the damage to the eyesight brought about by excessive and unshaded lights, is dealt with, but it cannot be too strongly insisted upon that we are living in an age of intemperance with regard to artificial light that is likely, after a few generations, to produce serious racial eye trouble. Already we cannot work with comfort by the light that served our fathers, and although a certain advance in quantity of light was an advantage as saving strain upon the eyes, yet there is no doubt that the present tendency to high-power incandescent and arc lights is not only inartistic, but harmful, as the small area from which the light is emitted and the high intensity throw a serious strain upon the eye, and yet the light given has but little diffusive power.

Chapters iv. and v., which deal with combustible illuminants and incandescent mantles, are the least satisfactory in the book, this being partly due to the fact that the conditions of cost here and in America are so different, and largely also to the evident fact that Dr. Bell is more at home with electric than with combustible illuminants.

When one finds it freely stated that "incandescent electric lamps are about equivalent to ordinary gas in cost, with a tremendous hygienic advantage in their favour," it must be remembered that the cost of the gas is 1 to 1.50 dollars per 1000 cubic feet, and that an electrician always overlooks the fact that the hot products of combustion from a gas flame are among the most powerful factors in ordinary ventilation. In Fig. 21, a Siemens regenerative burner is figured as a Wenham, whilst the Wenham is shown at Fig. 22 as a Siemens. Full justice is done to acetylene, but the author shows but little knowledge of the incandescent mantle when he speaks of it in one place as being composed of various blends of the more accessible of the rare earths and in another says it is "well known to consist essentially of the oxides of the so-called metals of the rare earths, chiefly thorium and yttrium." The data given as to the candle-power and life of the mantle also suggest that this part of the subject has not been quite brought up to date.

In the chapter on incandescent mantle lighting for open spaces, no mention is made of such high-candle-power units as are now given by the high-pressure gas systems and the Kitson (oil) burners; indeed, a mantle giving 100 candle-power is spoken of as somewhat exceptional, whilst in Berlin at the present time there are plenty of mantles giving 1500 candle-power with gas at a water pressure of 4½ feet.

Passing on to the chapters on electric lighting, one has nothing but praise; the author knows his work thoroughly, and a better popular treatise on the subject would be hard to find, whilst undoubtedly the best portion of the whole book is that dealing with the title matter—the art of illumination.

At the present time everything is being done that can be done to increase the intensity of local centres of light, a condition of things brought about by the advent of the electric arc for outdoor illumination, and the feeling that if gas or other illuminants are to hold their own for this purpose, they must be able to complete in this respect.

This, however, is an advance on totally wrong lines, and the author has done good service to the art of illumination by pointing out that its progress must always be in more and more complete subdivision of the illuminating radiants, and the subordination of great brilliancy to perfect distribution.

The concluding chapter deals with standards of light, and gives full credit to Mr. Vernon Harcourt's 10-candle pentane lamp as a trustworthy and reproducible standard.

Everyone interested in the present phases of street illumination will read with pleasure the remarks made by the author on the nominal rating of the candle-power of electric arc lamps, which "have long since

been relegated to the category of merely commercial designations, the rating bearing no more precise relation to the real thing than does the term 'best' as applied to flour or other commodities," a description fully realised when one sees a nominal 1000 candle-power arc blinking with a feeble 200 candle-power duty.

The book is so good, and deals with such a little studied subject, that it is to be hoped that the author will add to the value of the work in its next edition by either giving full references to the original papers or adding a short bibliography. It is undoubtedly a book which should take its place as a work of reference in the library of everyone interested in artificial illumination.

PHYSIOLOGICAL HISTOLOGY.

Methods and Theory of Physiological Histology. By Gustav Mann, M.D., C.M., D.Sc. Pp. xv + 488. (Oxford: Clarendon Press, 1902.) Price 15*s.* net.

A FIRST attempt at scientific research in a new field should always command our respect, and this book, professing to expound the methods of physiological histology with their underlying reasons, is no exception to the rule. The author has with incredible labour collected all the current information on physical chemistry colloids, histology and the chemistry of dye-stuffs, and has endeavoured to combine these into one harmonious and coherent whole, and to deduce from them reasonable answers to all the questions that have arisen on the subjects of the fixation and staining of animal tissues. That the explanations of the observed facts in histology have so far been fragmentary, incomplete and unsatisfactory, no one will deny, and if this work has hardly as yet brought us to a final and definite conclusion, the fault must be laid to the door of our collective ignorance of the matters involved rather than to the writer of the present volume.

A considerable space has been allotted to subjects which bear more or less directly on the theories afterwards propounded, and, as a rule, these are admirable summaries of the work already done. The chapter on colloids is especially worthy of praise. The chapters containing the accounts of the author's own carefully performed experiments are also very interesting, though whether all his readers will or will not agree with his conclusions is quite another matter. However, there is no question as to the success of the fixing fluids which have been proposed as a result of these researches, and the practical directions accompanying them will be of value to everyone who is not familiar with the processes employed. This comment applies also to all the methods recommended for staining, which give the result of a long and thorough experience in the various processes, and, speaking generally, we know of no better practical guide than is to be found here.

Then follow pages—very many pages—devoted to microchemical reactions, the theory of staining, and, as an appendix one-third as large as the book, on the chemistry of the coal-tar colours and similar matters, which space will not permit us to refer to at length. They will well merit careful study, but the question obtrudes itself as to whether the author has not gone a little too far afield, and whether it is really necessary to cover so many pages with chemical details already well known to experts and unintelligible to the ordinary reader without their context.

We regret that the author's modesty has not permitted him to add some account of *intra-vitam* staining and the examination of fresh tissues; we trust that in the future he may see his way to do so.

There are singularly few details to which exception can be taken, and small errors and misprints are conspicuously absent. The paper and general appearance of the book are, however, surely too meagre for the importance of the contents, and drawings of the author's preparations would be vastly more interesting than the illustrations of obsolete microtomes with which we are favoured. One page—460—must have been composed during a nightmare; we cannot imagine it represents the author's real views. It purports to treat of electrical measures. The *ampere* is defined as "a current which passes in every second at the rate of one coulomb through a conductor"! Ohm's law has a whole line to itself, and is thus printed:—"Ohm's law =

$$\text{current} \cdots \frac{\text{electromotive force}}{\text{resistance}} = \text{ampere} \frac{\text{volt}}{\text{ohm}} \text{"!!!}$$

It is very kind to tell us what a "macrocallory" is; we might otherwise have supposed it to be a kind of eel; in neither case is it a unit of electricity. Also——but we decently conceal the rest.

There is a very good index, and as a whole the book is one that is a most valuable contribution to our knowledge of physiological histology.

OUR BOOK SHELF.

The Figures, Facts, and Formulae of Photography. Edited by H. Snowden Ward. Pp. 166. (London: Dawbarn and Ward, Ltd., 1903.) Price 1*s.* net.

THERE is probably no other art that is so encumbered with formulæ as photography. Every maker of sensitive material seems to consider it his duty to supply his own particular formulæ for its use, and no doubt this has something to recommend it, but even conveniences may be multiplied until they result in confusion. Many formulæ for developers, for example, differ only in the methods of expressing them, except to an inappreciably small extent due to the use of different weights and measures. And when it is borne in mind that by far the greater number of formulæ are not based on a systematic trial of the effects of varying each of its constituents, as all ought to be, the value of even notable differences disappears.

But to eliminate useless formulæ is practically impossible, as it would introduce differences of opinion as well as of fact. We think, therefore, that the compiler of this volume has done quite right in including the "instructions" of the various manufacturers, and we should have preferred that he had gone even further than he has, and given the formulæ recommended by foreign as well as English houses. Of other formulæ for developers, we find those adopted by Messrs. Burroughs Wellcome and Co. for their "tabloid" preparations described as "standard" formulæ, though